



# I&W Brine Well Update

*Radioactive & Hazardous Materials Committee*

*September 5, 2012*













US 62/180

E2

E1

BNSF Railroad

US 285





US 62/180

E2

E1

BNSF Railroad

US 285

CID Canal





US 62/180

Feedstore

E2

E1

Ag Supply

Church

BNSF Railroad

US 285

CID Canal

Trailer Park





US 62/180

Service  
Stations

Feedstore

E2

E1

Ag Supply

Church

Truck Stop

BNSF Railroad

US 285

CID Canal

Trailer Park





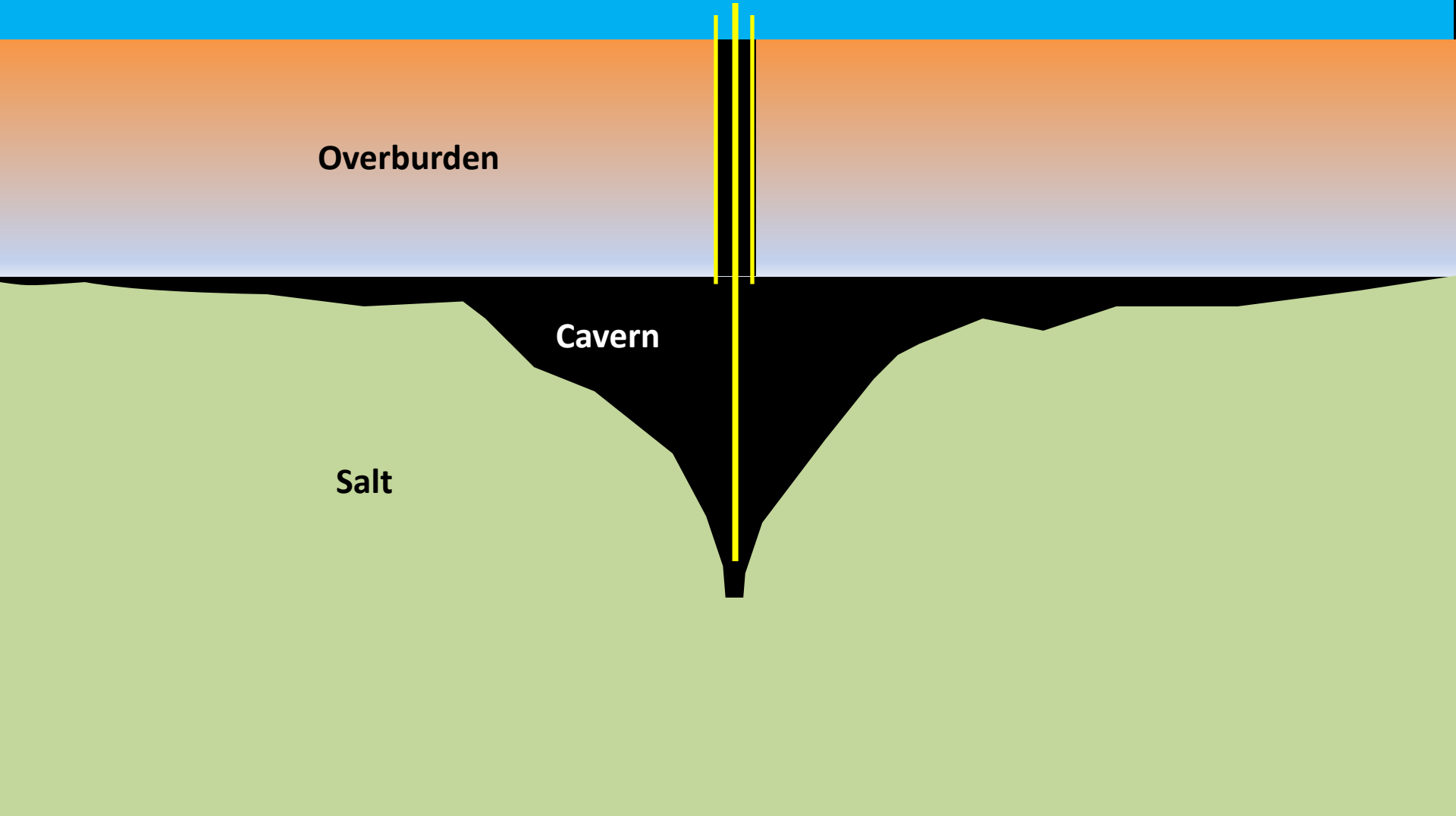
1,700 feet

1,000 feet





# Current Working Theory



Overburden

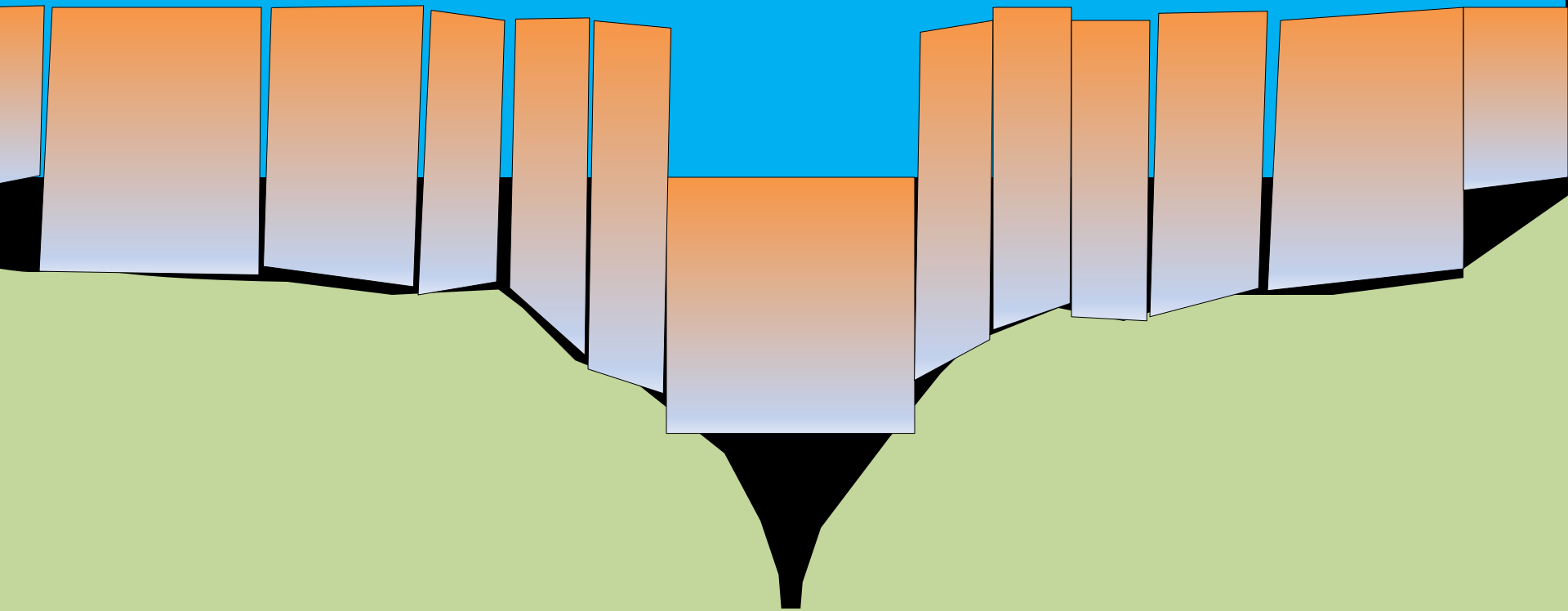
Cavern

Salt





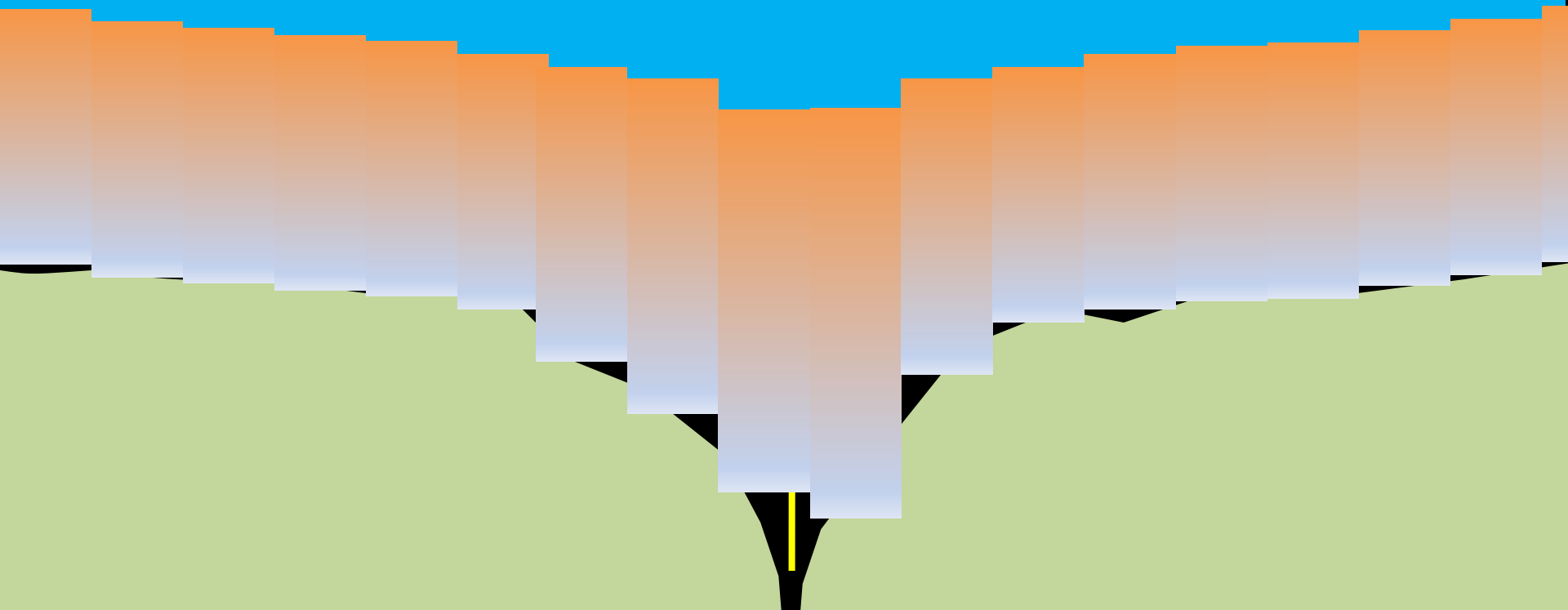
# Sinkhole with Concentric Fractures







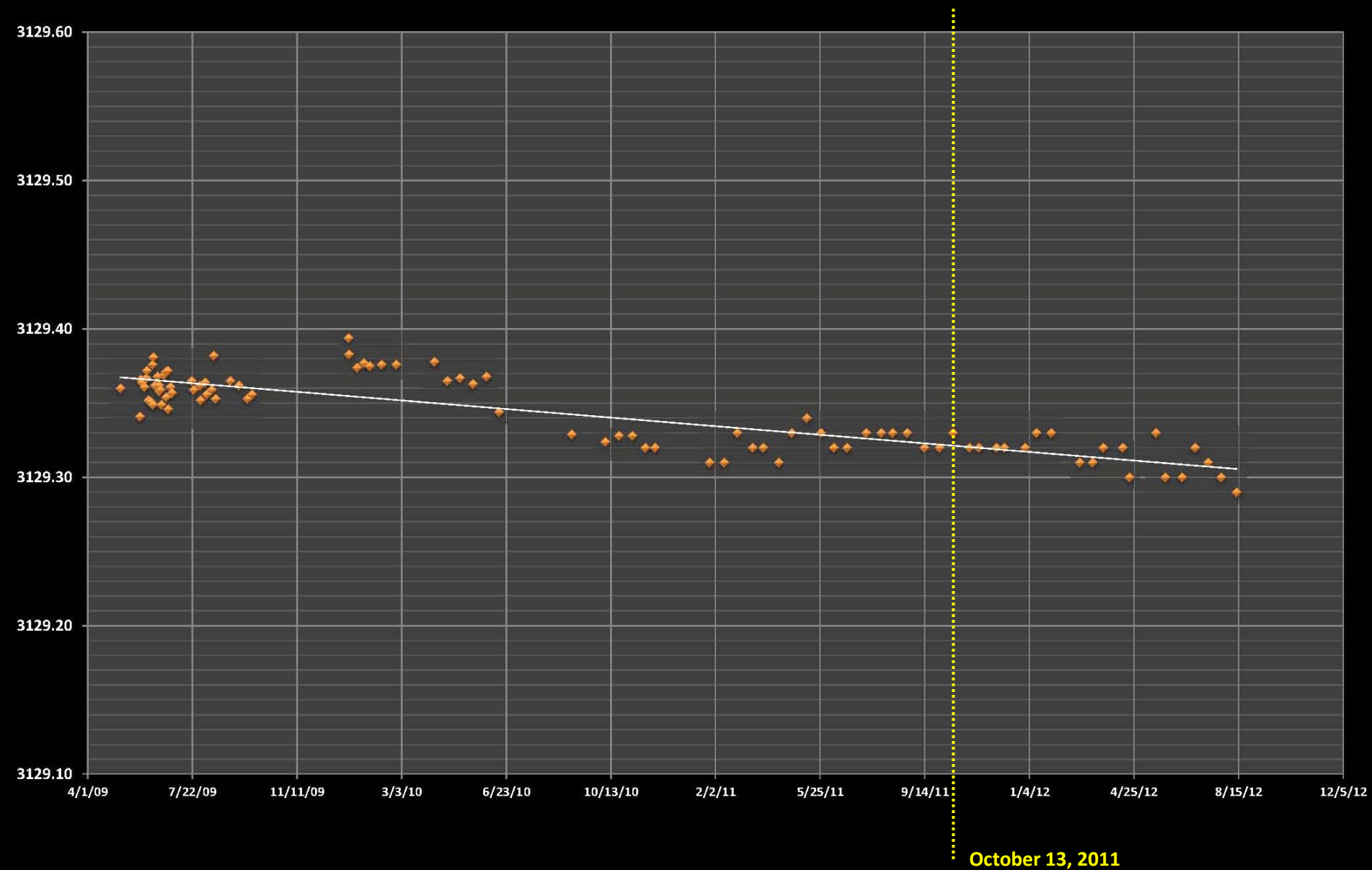
# Subsidence Bowl





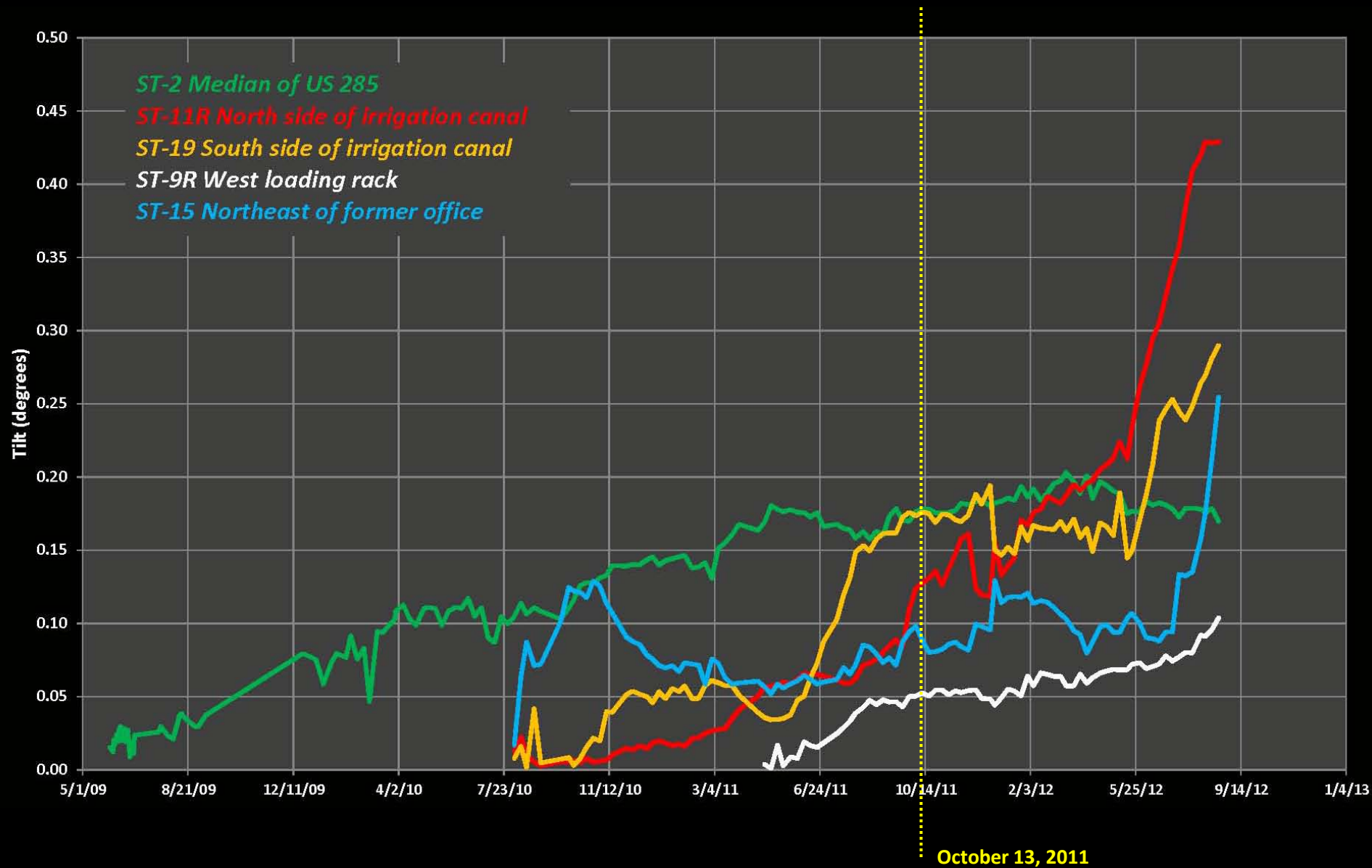


# Surface Subsidence





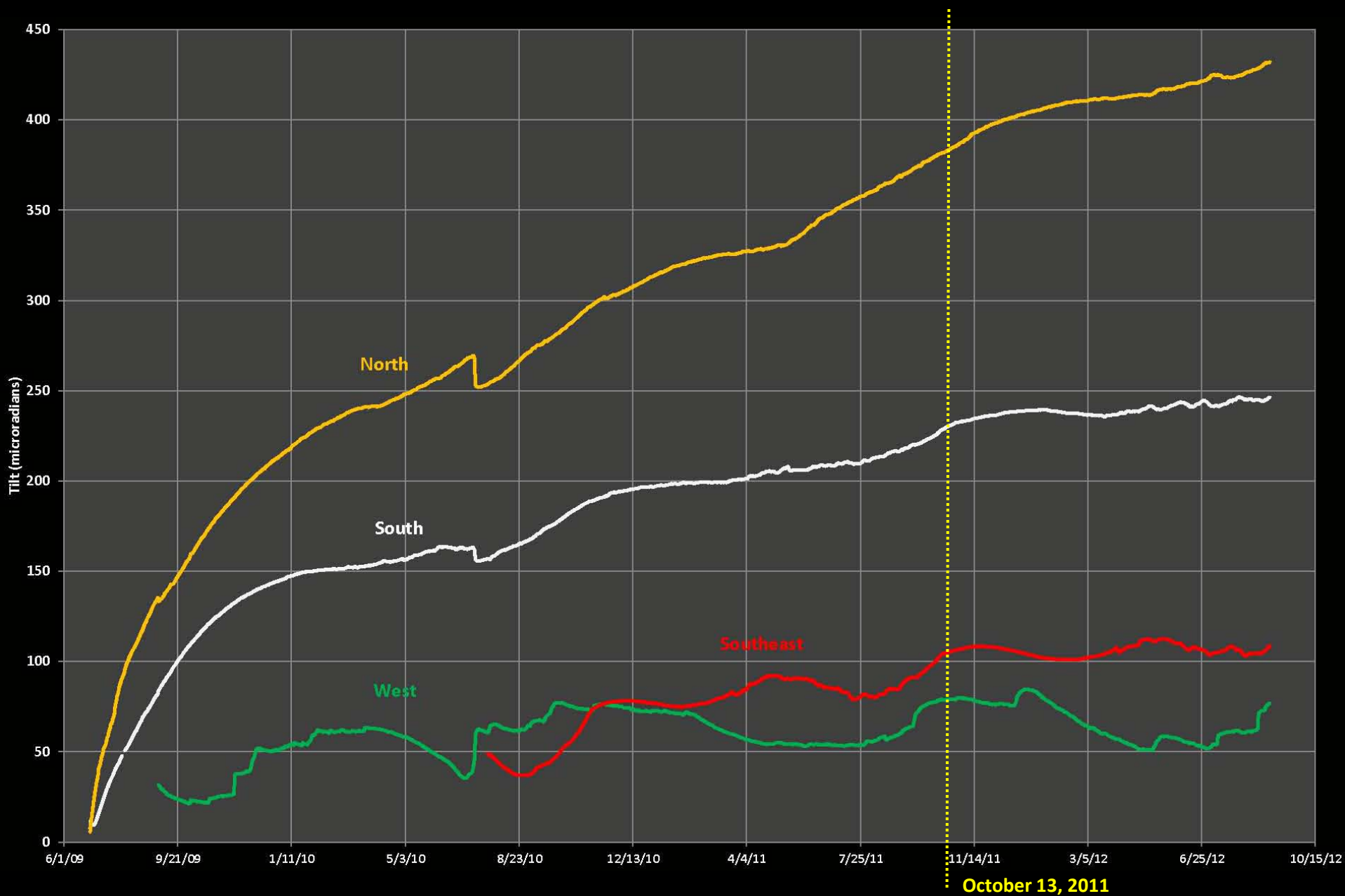
# Surface Tiltplates







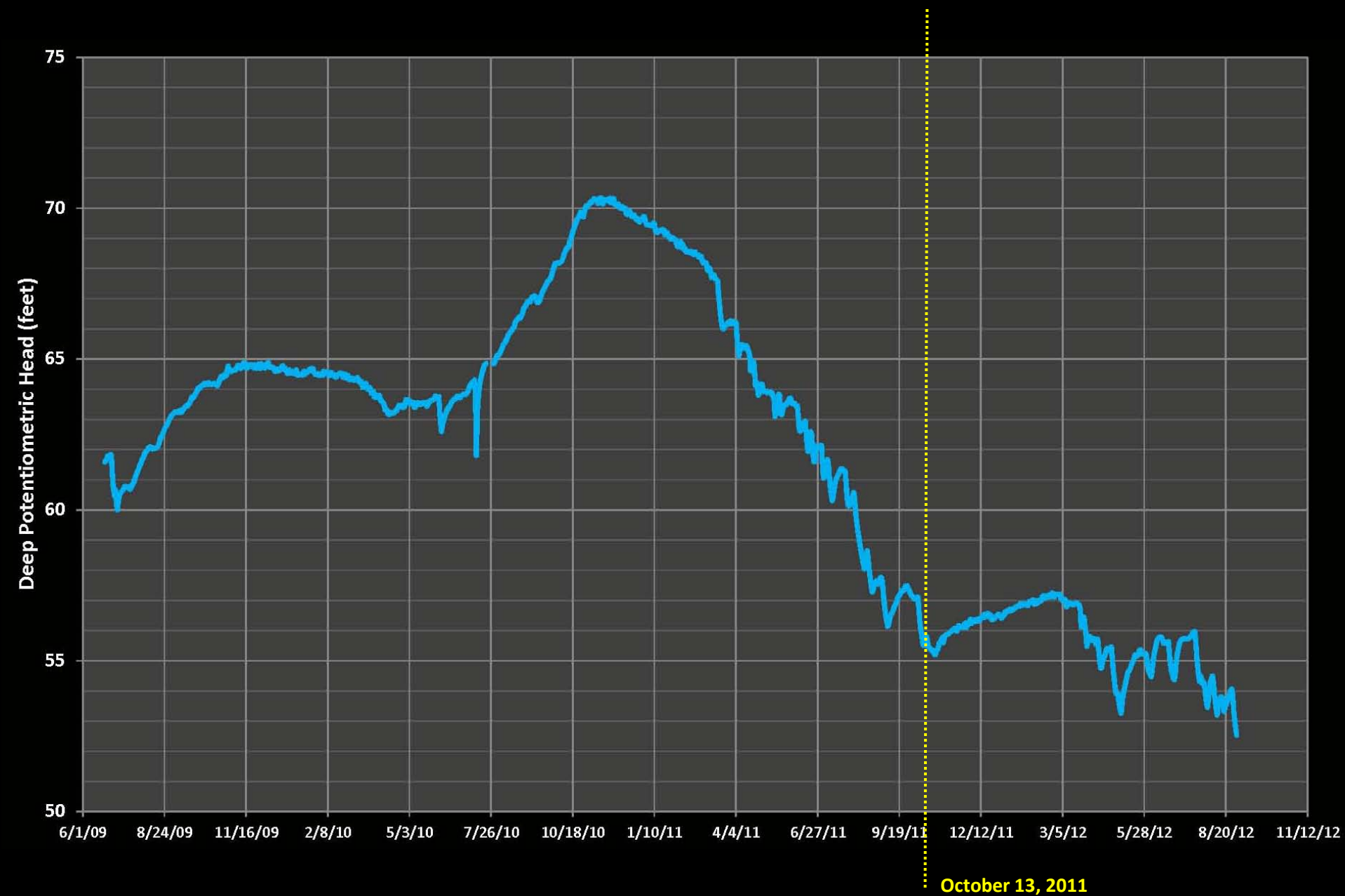
# Borehole Tiltmeters







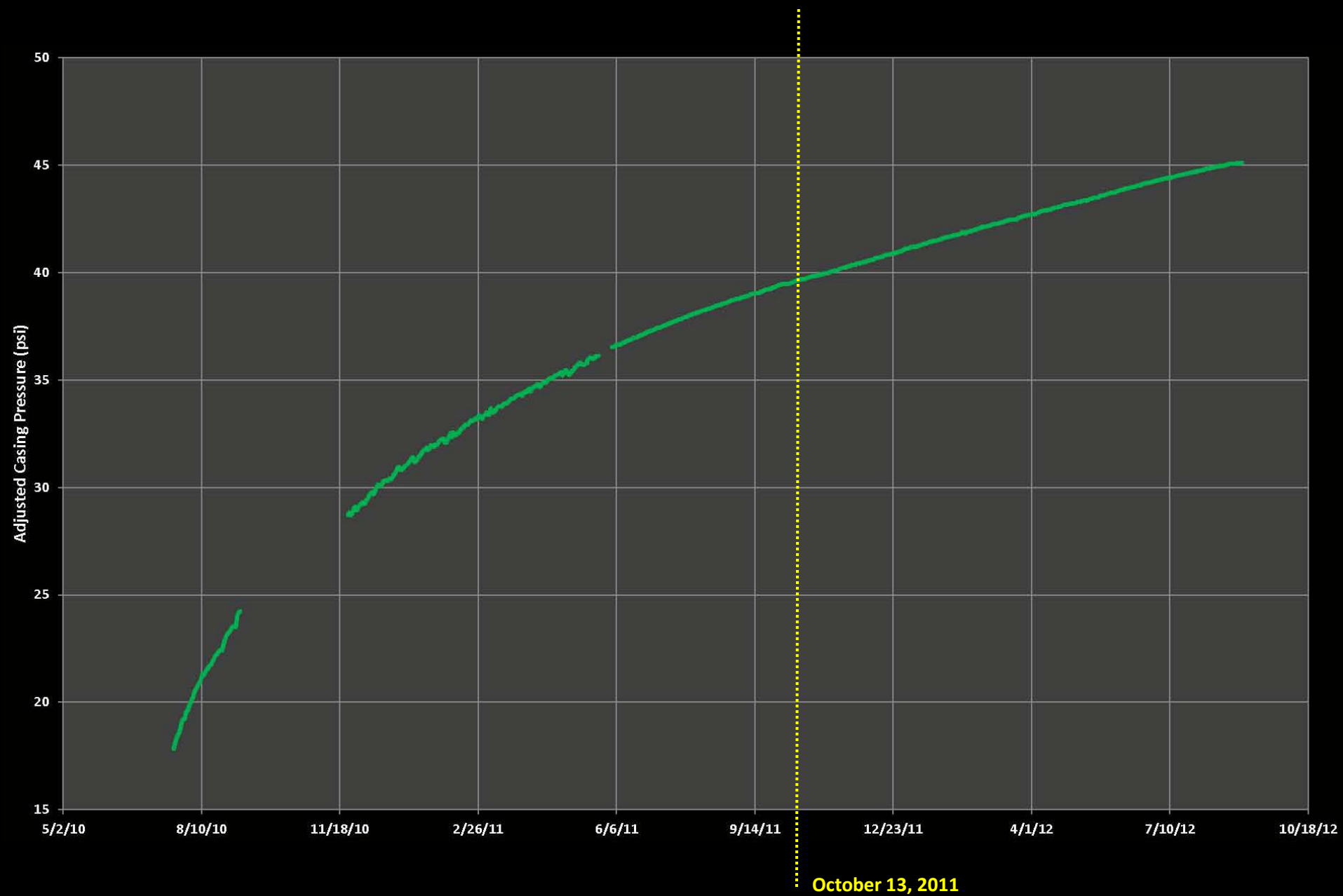
# Groundwater Levels







# Cavern Pressure Monitoring



# Professional & Technical Services Contract

April 2012 - Request for Proposals issued by State Purchasing

May - Pre-Proposal Conference – Ten firms attended

June – Four proposals received

July – AMEC Environment & Infrastructure notified as winner

Present - Contract nearly finalized



# Professional & Technical Services Contract

## Scope of Work

### Task 1. Site Monitoring and Early Warning

- Assume operational responsibility for monitoring program
- Evaluation of all systems and programs
- Recommend improvements
- Implement approved improvements including webcams and microseismic system

# Professional & Technical Services Contract

## Scope of Work

### Task 2. Continued Geophysical Characterization

- Repeat magnetotelluric survey on tighter grid within I&W property
- Advance and log multiple off-cavern coreholes
- Reinterpret existing seismic, magnetotelluric, resistivity, and microgravity surveys



# Professional & Technical Services Contract

## Scope of Work

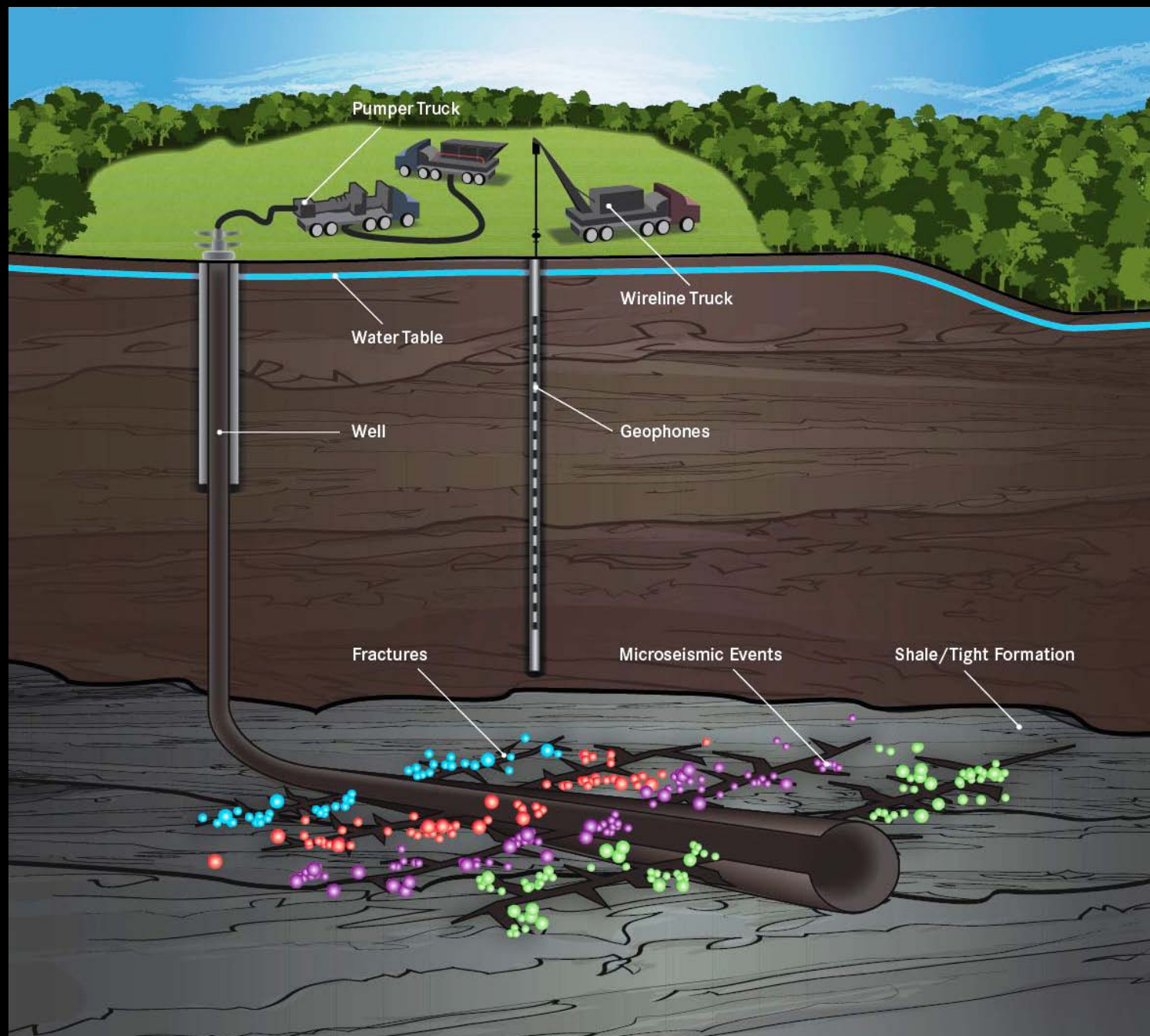
### Task 3. Feasibility Study

- Conduct stakeholder meetings
- The written feasibility study will include possible corrective actions evaluating the strengths and weaknesses of each along with cost estimates for implementation. The study will also include the concerns of stakeholders.

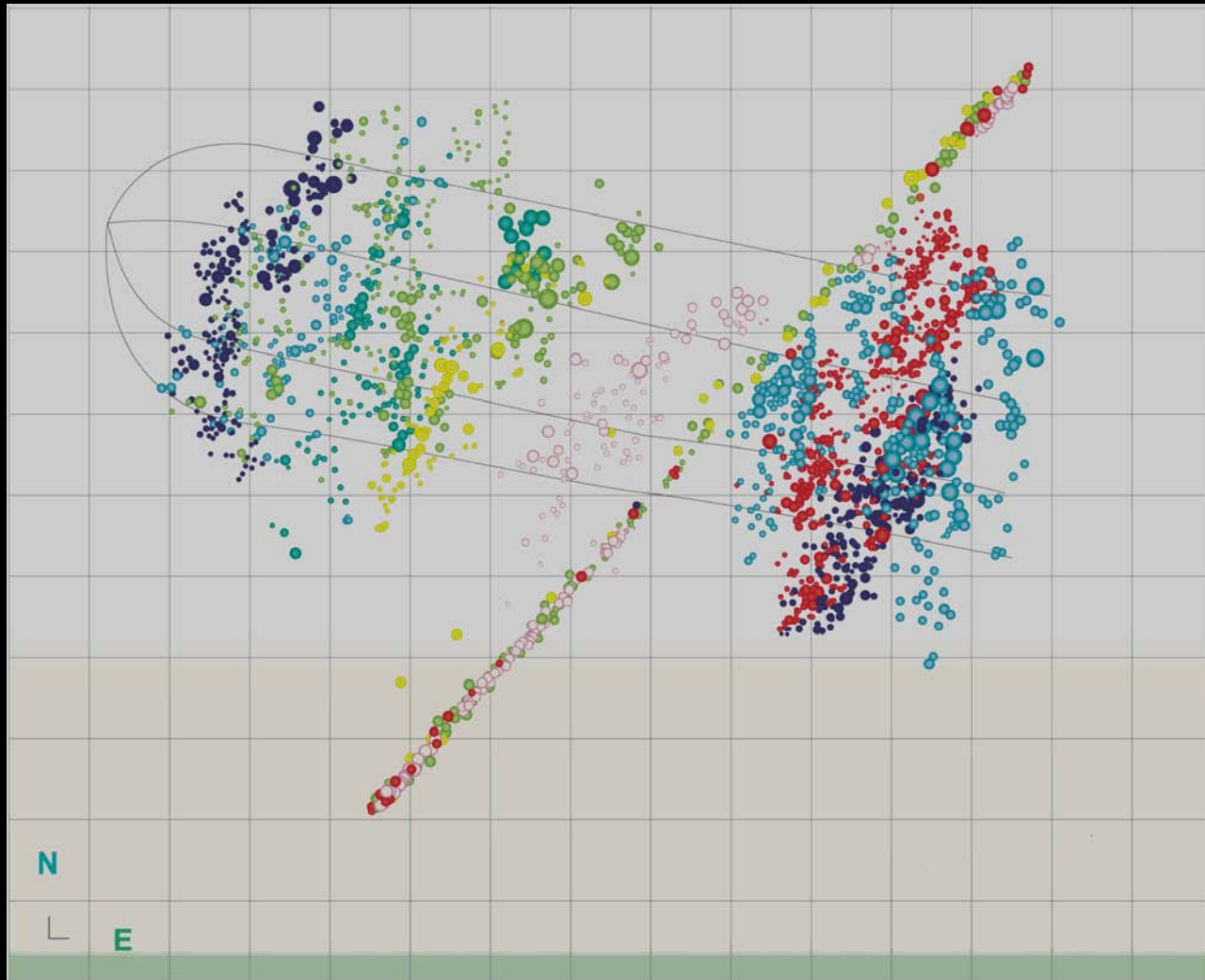
# Microseismicity

- Listening for low energy seismic noise emitted from a reservoir during hydraulic fracture stimulation
- Allows direct detection of patterns of fluid movement, fracture development, or compaction
- Passive geophone arrays monitor microseismic events in real time to potentially provide not only early warning of a significant failure in integrity, but also to develop 3-dimensional structural imaging of the cavern





# Microseismicity



Microseismicity along existing fracture activated by frac stimulation

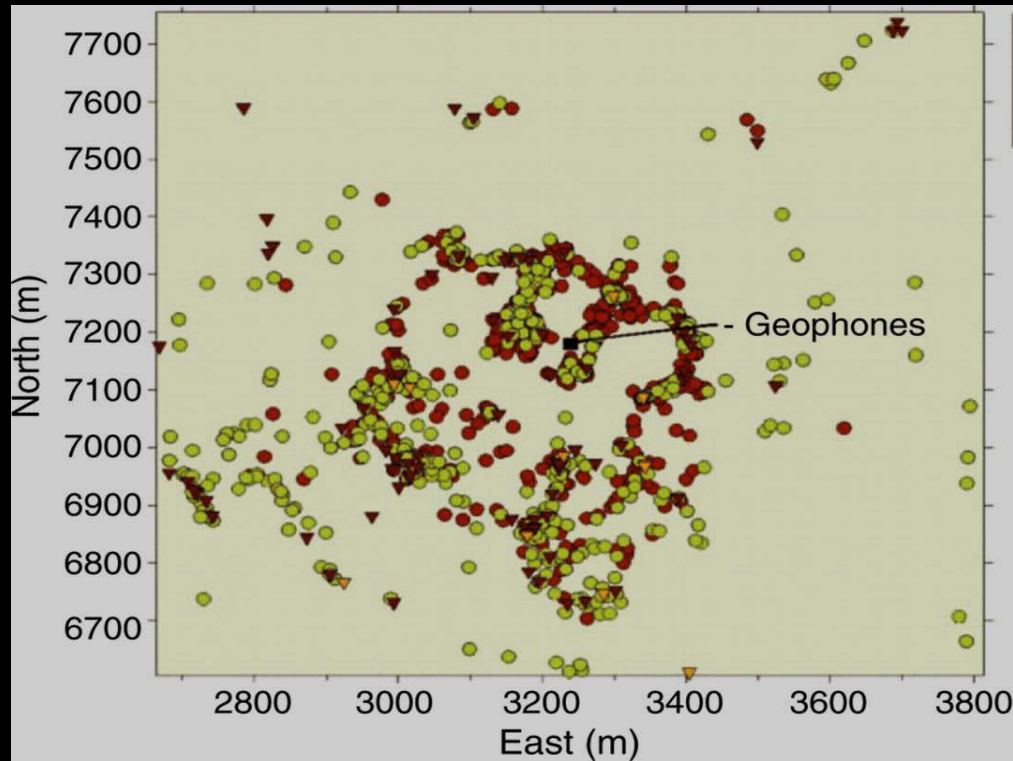




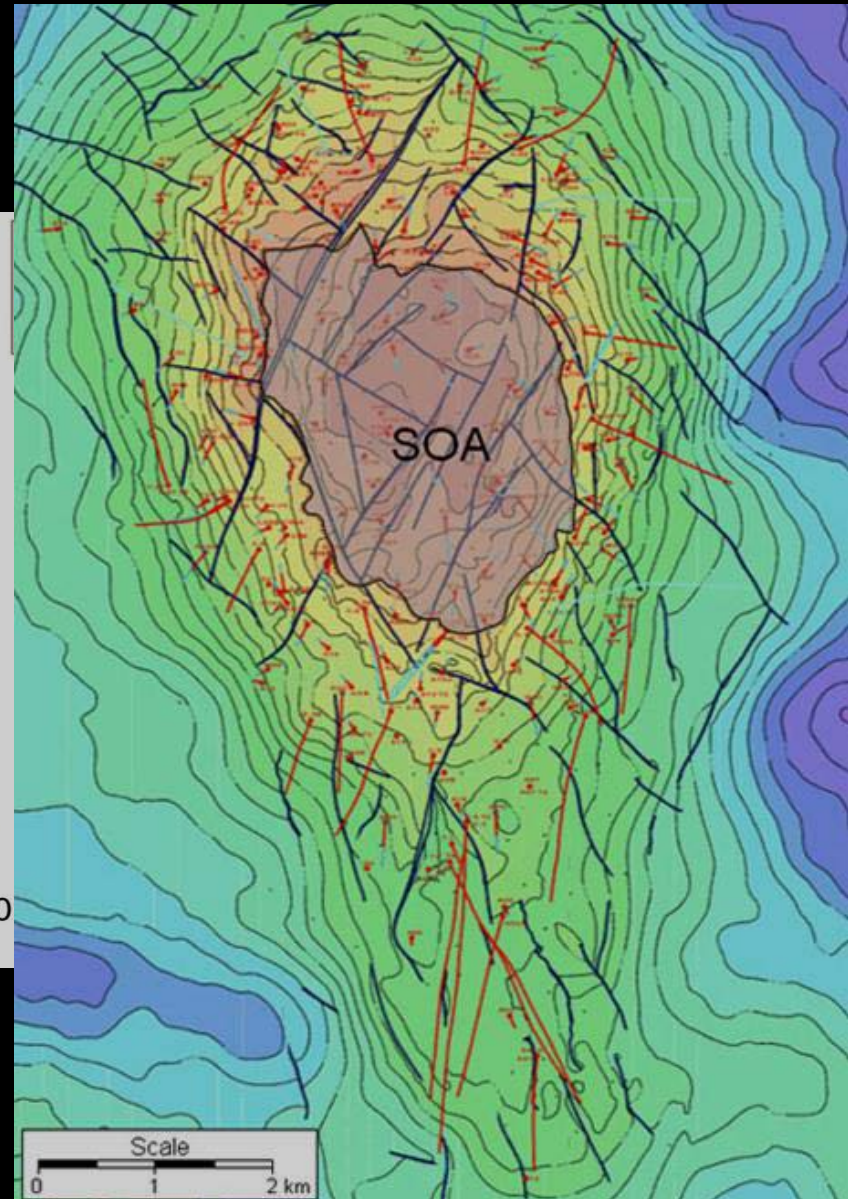
# Microseismicity



# Microseismicity

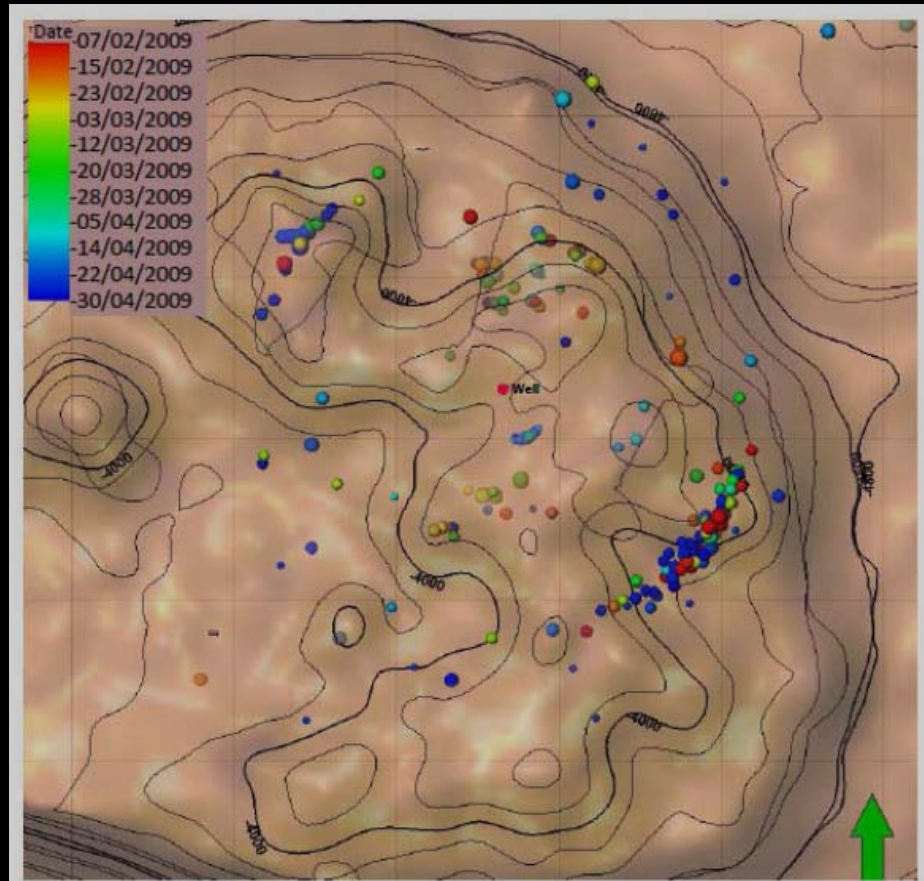
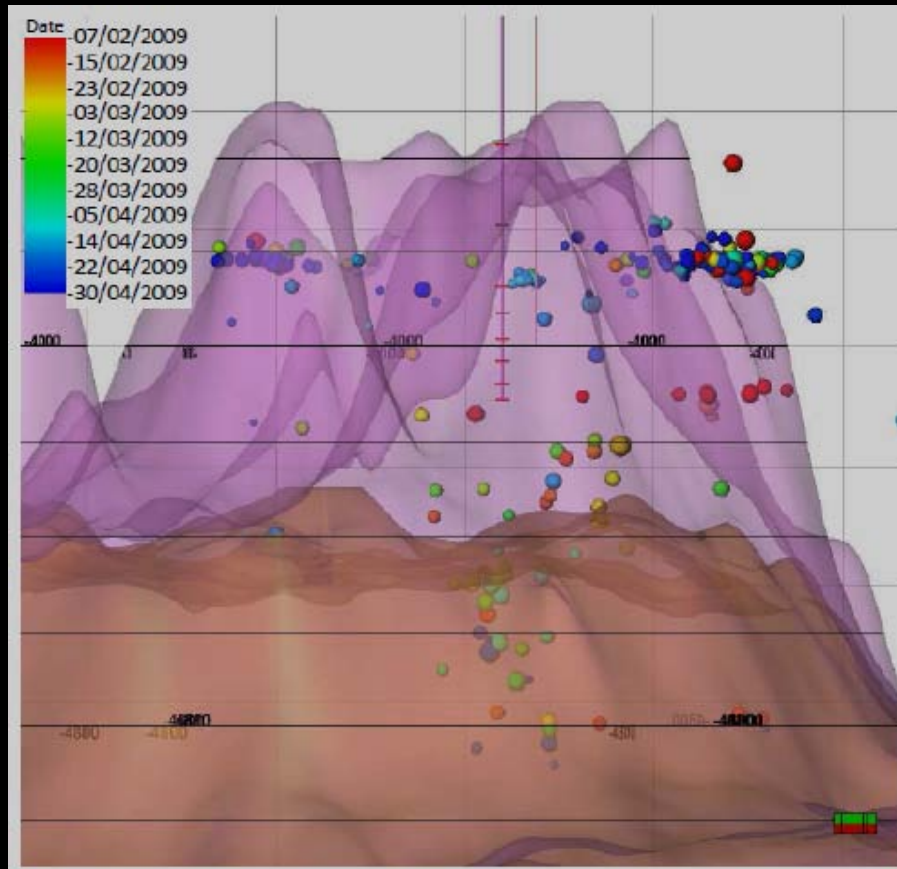


Ekofisk Oil Field  
(Central Graben/North Sea)





# Microseismicity



Microseismicity related to movement of sediments over a reef structure



# Microseismicity

- Enhanced degree of early warning due to the ability to locate seismic sources subsurface in three dimensions
- Indicate where failing areas of the cavern are such that remedial actions can be prioritized and are most cost-effectively directed
- Quicker determination of the success of remediation



# New Mexico Brine Production – 1/1/10 thru 3/31/12

